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Project Description

This chapter identifies existing and projected transportation problems and defines the need for transportation improvements, which establish the project purpose and need. This chapter also describes the study area and summarizes the history of the project.

1.1 Project Description

The Connecticut Department of Transportation (ConnDOT), in cooperation with the Southeastern Connecticut Council of Governments (SCCOG) and the Federal Highway Administration (FHWA), has determined that transportation improvements are necessary in southeastern Connecticut to address current and projected roadway deficiencies. The purpose of the Connecticut Route 2/2A/32 Environmental Impact Statement (EIS) project is to provide a safe and efficient transportation improvement solution to relieve traffic congestion and improve safety on the Route 2, 2A, and 32 corridors and associated state routes that intersect with Route 2.

Prior to the EIS, the Route 2/2A/32 study area was the subject of a Major Investment Study (MIS) in 1994-1996, which included an extensive public participation process. The MIS identified and evaluated a wide range of potential transportation improvements for the area, and eventually recommended six alternatives to address the long-term transportation needs of the area. These six alternatives, which include transit and highway improvements, are now the subject of this EIS.

1.2 Study Area

The Route 2/2A/32 EIS study area includes the major state roads in the southeastern corner of Connecticut between Norwich, New London, and Westerly, Rhode Island, and north of I-95. The Route 2/2A/32 MIS focused on this whole triangle. At the completion of the MIS, as the number of alternatives under consideration was narrowed, the general study area for the EIS was also narrowed to focus more specifically on several major corridors. Figure 1.2-1 illustrates the EIS study area.

The EIS study area includes several key roadway and multimodal connections with Interstate 95 (I-95), Interstate 395 (I-395), and Amtrak. The I-95 / Route 2 interchange (Exit 92) is located at the southeast corner of the study area. The I-395 interchanges with Route 2 (Exit 80) and Route 2A (Exit 79A) are located in the northwest portion of the study area. All three highway interchanges serve as major gateways to the region. New London and Westerly, RI also serve as regional gateways. New London is home to an Amtrak station with Amtrak and commuter rail service, several ferry services and the newly renovated State Pier cargo terminal. Westerly also has an Amtrak station.

The EIS study area also includes a number of important traffic generators, including the Foxwoods Resort Casino and the Mohegan Sun Resort. Also within or near the study area are several other tourist / visitor attractions in Norwich, New London, Groton, Mystic, and Westerly.

The following sections describe the study area corridors and the regional transportation system in more detail.

1.2.1 Key Study Area Corridors

The key EIS study area corridors include Route 2 from Norwich to Stonington; Route 2A in Montville and Preston; Route 32 in Montville and Waterford; and Route 164 in Preston. These corridors are described below.

1.2.1.1 Route 2

Route 2 is a major east-west state highway, providing the primary access between the metropolitan Hartford area and southeastern Connecticut. Route 2 has long experienced congestion between Norwich and Westerly. This traffic congestion was previously associated with summer weekend beach traffic and now has increased as a result of substantial economic development over the past decade, particularly related to tourism. Land uses along Route 2 include residential, rural, and commercial uses. The Foxwoods Resort Casino is the largest single land use and traffic generator along Route 2 within the study area. Route 2 provides the primary access to the resort via Route 2A and Route 164 from the north and west, and via I-95 from New York, southern Connecticut, Rhode Island, and eastern Massachusetts. Within the study area, Route 2 intersects with Routes 165, 2A, 117, 164, 214, 201, and 184, which provide access to Norwich, Preston, Griswold, Montville, Ledyard, Groton, North Stonington, and Stonington.

1.2.1.2 Route 2A

Route 2A runs east-west between I-395 in Montville and Route 2 in Preston. It crosses the Thames River at the Mohegan-Pequot Bridge and serves as the main street for the historic and residential villages of Poquetanuck and Hallville. Within the study area, Route 2A intersects with Routes 12, 32 and 117, which provide access to Ledyard, Groton, Norwich, Montville, and Waterford. Route 2A provides the primary access to the Mohegan Sun Resort via a new interchange west of the Mohegan-Pequot Bridge. Route 2A also is the only major crossing point of the Thames River between New London and Norwich. With the limited opportunities for east-west traffic movement across the Thames River, travel demands on Route 2A have more than doubled since 1988,This regional through traffic and the abundance of bus traffic traveling to and from the casinos currently conflict with local traffic and pedestrian movements in the village centers.

1.2.1.3 Route 32

Route 32 runs north-south along the west side of the Thames River from New London to Norwich. Within the study area, Route 32 connects with Route 2A, and Route 163. Outside the study area, Route 32 connects with Route 2 to the north and with I-95 to the south. Approximately half way between Norwich and New London, Route 32 connects to I-395 via the I-395 Connector. Land uses along Route 32 differ somewhat north and south of the I-395 Connector. North of the Connector, the land use pattern is a mix of commercial and residential development. South of the Connector, the land use pattern is predominantly residential. Route 32 also provides secondary access to the Mohegan Sun Resort via Sandy Desert Road, north of Route 2A.

1.2.1.4 Route 164

Route 164 is a north-south, two-lane, undivided state highway that runs between Route 2 in Preston and I-395 in Griswold. Within the study area, Route 164 intersects with Route 165, which provides access to Norwich and Griswold. For motorists traveling on I-395 South, Route 164 is a preferred route to reach Foxwoods and eastern portions of the study area because it is shorter than other routes (e.g., remaining on I-395 and crossing the Thames River, either in downtown Norwich or on Route 2A at the Mohegan-Pequot Bridge). Land use along Route 164 is predominantly residential and agricultural.

1.2.2 Regional Transportation System

The regional transportation system is comprised of the interstate highway system, several state highways, and various public and private transportation services. These highways and transportation services are not being directly analyzed as part of the Route 2/2A/32 EIS. They are described here for informational purposes.

1.2.2.1 Interstate Highway System

I-95 is a divided, limited-access interstate highway that travels north-south along the east coast of the United States. Within southeastern Connecticut, I-95 actually travels in an east-west direction along the shoreline of Long Island Sound. Southeastern Connecticut is located approximately half way between New York City and Boston, Massachusetts. The number of lanes provided on I-95 varies from two per direction to six per direction on the Gold Star Bridge, in New London where I-95 crosses the Thames River. Within the project study area, I-95 provides direct access to local roadways at several highway interchanges, thereby connecting the study area roadways to the larger, interstate transportation system.

I-395 is also a divided, limited-access interstate highway that travels north-south between I-95 in East Lyme and the Massachusetts Turnpike, where the highway becomes I-290. I-395 generally provides two lanes in each direction. I-395 also provides direct access to several key roadways in the study area, including Route 2A, Route 32, and Route 164.

1.2.2.2 Other State Roadways

Other state roadways within the study area include Route 12, Route 117, Route 201, Route 49, Route 165, Route 214, and Route 184. Within the study area, these roadways are generally two-lane roadways with rural/residential characteristics.

1.2.2.3 Amtrak Service

Amtrak's Northeast Direct service provides passenger service between Newport News, Virginia and Boston, Massachusetts. Stops in the Route 2/2A/32 study area are located in New London, Mystic and Westerly, Rhode Island. Service consists of 17 trains daily (8 northbound and 9 southbound) with service hours from 4:00 AM to 10:30 PM. Amtrak's service is designed around interstate, or longer distance, travel rather than the local commuter market. The Amtrak line is scheduled for full electrification between New Haven, Connecticut and Boston, Massachusetts. Once

complete, faster and more frequent passenger rail service will be provided on this corridor.

1.2.2.4 Shore Line East Commuter Rail Service

ConnDOT's Shore Line East commuter rail service provides commuter transportation between New London and New Haven, Monday through Friday. There are four daily trains that service New London (the remaining trains begin and end at the Old Saybrook Station, west of New London). Westbound trains depart New London at 5:28 AM and 6:28 AM, and eastbound trains arrive at 6:15 PM and 7:25 PM. Travel time from New London to New Haven is approximately 70 minutes.

1.2.2.5 New England Central Railroad

The New England Central Railroad (NECR) runs from the Amtrak Shore Line in New London, Connecticut to Palmer, Massachusetts. Within the study area, the NECR runs along the west side of the Thames River from New London to Norwich. This portion of the NECR is currently used for a privately-operated freight service only, including one round trip freight train per day. The train originates in Willimantic and services local customers between Willimantic and New London.

1.2.2.6 Providence & Worcester Railroad

The Providence and Worcester Railroad (P&W) runs from the Amtrak Shore Line in Groton, Connecticut to Worcester, Massachusetts. Within the study area, the P&W runs along the east side of the Thames River from Groton to Norwich. This portion of the P&W is currently used for a privately-operated freight service with two round trip freight trains per day. The trains originate in Plainfield and service local customers between Plainfield and Groton.

1.2.2.7 SEAT Bus Service

Local bus service is provided by SouthEast Area Transit (SEAT). SEAT currently operates 13 bus routes within and between New London, Groton, and Norwich, with additional intertown service to Waterford, Niantic, Taftville, Occum, Greenville, Yantic, Norwichtown, North Stonington, Jewett City, Noank, Mystic, and Pawcatuck.

SEAT bus service is provided from about 7:00 AM to 7:00 PM on weekdays, and some routes provide limited service on Saturdays. Buses run every hour for local service and every two hours for intercity service. Fares are based on a "zone" system and range between $1.10 and $2.10.

1.2.2.8 Ferry Services

There are several ferry services currently operating in southeastern Connecticut, all out of New London:

- The Fisher Island Ferry carries passengers and cars between New London and Fisher Island, New York year round.

- The Cross Sound Ferry operates between New London and Orient Point (Long Island), New York. Cross Sound has auto / passenger ferries that operate year round. In 1995, Cross Sound began operating the Sea Jet I high speed, passenger-only ferry service with a travel time of 40 minutes, compared to an hour and twenty minutes for the regular run. The Sea Jet I service was established to cater to casino patrons. Both casinos provide bus service from the ferries to the casinos.

- The Montauk Ferry carries passengers between New London and Montauk (Long Island), New York between Memorial Day and Labor Day.

- The Block Island Ferry carries passengers and cars between New London and Block Island, Rhode Island from mid-summer to mid-September.

- Fox Navigation operates the Sassacus high speed, passenger-only ferry service. Service between New London and Martha's Vineyard, Massachusetts is expected to resume in 1999 and operate during the spring, summer, and fall months. In November 1998, the *Sassacus* began operating between New London and Jersey City, New Jersey. Foxwoods provides a bus connection from the ferry dock to the resort. This service was discontinued in February, 1999.

1.3 Project History

Southeastern Connecticut has traditionally been known for its historic and rural character combined with a long history of maritime activities, including whaling, shipbuilding, and more recently, design, construction, and operation of submarines for the U.S. Navy. Since the early 1990s, defense-related employment in southeastern Connecticut has declined, while other industries have thrived. Tourist attractions continue to draw increasing numbers of visitors to the area. In addition, the gaming industry has established itself in the region. Both the Foxwoods Resort Casino and the Mohegan Sun Resort have experienced a high level of success. This recent economic development has placed increased travel demands on the region's roadways.

1.3.1 Traffic Volumes and Trends

Historically, traffic growth in the study area has varied by location. Table 1-1 shows traffic volumes on key roadways for four time periods: 1980, 1991 / 1992 (prior to the opening of the Foxwoods Resort Casino), 1993 / 1994 (shortly after the opening of Foxwoods), and 1997 / 1998 (after the opening of the Mohegan Sun Resort). Between 1980 and the early 1990s, traffic volume growth on Routes 2, 2A, 32, 164, and 214 was consistent with typical growth seen throughout southeastern Connecticut, and reflected the growth and dispersion of the population and employment bases that occurred in the 1980s. Since the early 1990s, traffic volumes have increased much more substantially and rapidly as a direct result of the opening of Foxwoods, and more recently, the Mohegan Sun Resort. This effect is clearly seen in Table 1-1.

Note that throughout this document, the traffic volumes reported are two-way traffic volumes unless otherwise indicated. Two-way traffic volumes include traffic travelling in both directions on a roadway. For example, the two-way traffic volume on Route 2 represents the sum of daily eastbound and westbound traffic.

Table 1-1
Average Daily Traffic Volume Trends, 1980-1998

Location	1980	1991/1992	1993/1994	1997/1998
Route 2 between I-95 and Route 184	6,200	12,900	18,600	19,700
Route 2 between Routes 184 and 201	4,600	9,200	19,200	24,400
Route 2 between Routes 201 and 214	3,800	9,300	22,200	22,400
Route 2 between Routes 214 and 164	4,500	7,000	25,000	27,400
Route 2 between Routes 164 and 2A	4,700	11,000	21,400	22,200
Route 2 between Routes 2A and 165	4,300	11,200	13,500	13,550
Route 2A at Mohegan-Pequot Bridge	8,300	15,500	18,900	23,250
Route 2A through Poquetanuck Village	N/A	6,500	10,300	12,400
Route 32 north of I-395 Connector	14,100	12,100	11,300	14,300
Route 164 north of Route 2	3,400	5,200	10,200	10,300
Route 214 between Route 117 and Shewville Road	N/A	2,400	3,900	6,100

Source: ConnDOT traffic counts
N/A: No ConnDOT count available

The following sections describe the history of the Route 2/2A/32 project, other transportation improvement projects recently implemented or planned in the area, and other transportation studies that are currently underway.

1.3.2 Route 2/2A/32 Major Investment Study

In 1994, concerns over substantial traffic growth and the associated congestion and safety impacts on Route 2, Route 2A, Route 214, and other roads near Foxwoods led ConnDOT and SCCOG, as the regional Metropolitan Planning Organization (MPO), to initiate a MIS for the Route 2 and Route 2A corridors. MISs are called for in Section 450.318 of the joint Federal Highway Administration (FHWA)/Federal Transit Administration (FTA) Final Rule on Statewide and Metropolitan Planning (effective November 29, 1993). This requirement was triggered by the Intermodal Surface Transportation Efficiency Act (ISTEA), the 1990 Clean Air Act Amendments (CAAA), and the National Environmental Policy Act (NEPA) of 1969. A major investment is officially described as a "highway or transit improvement of substantial cost that is expected to have a significant effect on capacity, traffic flow, level of service, or mode share at the transportation corridor scale." Consistent with FHWA's MIS guidelines, the Route 2/2A/32 MIS included a focus on multimodal solutions, and included a wide range of participants in the study and decision-making process.

Early public outreach meetings for the MIS in 1994 identified concern over future development on the west side of the Thames River, including the planned Mohegan Sun Resort and redevelopment efforts in New London and Norwich. As a result, the MIS scope was extended to include the Route 32 corridor. The MIS process evaluated potential multimodal transportation improvements to the Route 2, Route 2A, and Route 32 corridors from the Norwich/Montville area to the Rhode Island state line. The goal of the MIS was to define a list of alternatives that addressed the long-term transportation needs of the area.

The first stage of the MIS focused on the formation of a Multimodal Advisory Committee (MAC) to serve as the core of the community outreach effort. The MAC was comprised of representatives from the study area towns, the Mashantucket Pequot Tribe and the Mohegan Tribe, as well as federal, state, and regional agencies. The purpose of the MAC was to propose and evaluate viable transportation alternatives which could improve corridor traffic conditions and transportation access in the study area over a 10 to 20 year time horizon. Another purpose for MAC formation was to foster a cooperative, regional approach to solving major transportation problems.

Following MAC formation, the MIS focused on extensive data collection, field observations, and discussions with the MAC to identify the existing transportation conditions and problems within the study area. Future traffic

conditions for the year 2015 were then developed in the third stage of the MIS.

The fourth stage of the MIS involved the identification and evaluation of a wide range of multimodal transportation alternatives to address the defined needs. Over 100 potential transportation actions were identified and evaluated. Over the course of the MIS and with input from the MAC and the public, this list was screened and refined to comprise the six alternatives carried forward into the EIS. A public meeting in September 1996 formally closed the MIS process, introduced the six EIS alternatives to the public, and initiated the EIS scoping process. The *Route 2/2A/32 Major Investment Study Final Report* was published in January 1997.

1.3.3 Other Recent and Planned Improvements

Several transportation improvement projects, separate from this study, have been implemented, planned, or are currently under study in southeastern Connecticut. Key projects are listed below and shown in Figure 1.3-1.

- Route 2A / Mohegan Sun Interchange: In 1995-1996, prior to the opening of the Mohegan Sun Resort, the Mohegan Tribe constructed a new highway interchange on Route 2A west of the Mohegan-Pequot Bridge to provide primary access to the resort. In addition, Route 2A was widened to four lanes between I-395 and the new interchange to provide the capacity needed to handle the number of vehicles expected to visit the resort. The Mohegan Tribe is currently proposing additional modifications to Route 32 north of Route 2A in conjunction with proposed resort expansion.

- Route 32 south of I-395 Connector: approximately 3.5 km (2.2 miles) of Route 32 in Waterford was upgraded in 1998 by ConnDOT. This roadway segment was upgraded through the addition of a jersey barrier median and turning lanes to improve safety.

- Route 2 south of I-95: approximately 2.4 km (1.5 miles) of Route 2 between I-95 and Route 78 in Stonington will be widened to four lanes to address capacity deficiencies partially associated with seasonal traffic. This project will be undertaken by ConnDOT. An Environmental Assessment has been completed and FHWA issued a Finding of No Significant Impact (FONSI) in December 1996.

- Route 2 between Route 164 and Route 214: approximately 4.1 km (2.6 miles) of Route 2 between Route 164 and Route 214 in Preston and

Ledyard will be widened to four lanes to address capacity deficiencies associated with traffic entering and exiting the Foxwoods Resort Casino driveways. This project will be undertaken by the Mashantucket Pequot Tribe as part of the tribe's State Traffic Commission (STC) requirements.

- Local Access Management Studies: In 1998, access management studies were completed for several roadway corridors in southeastern Connecticut, including Route 2, Route 2A, Route 32, Route 12, and Route 164. The recommendations generally included curb cut reductions and planning and zoning changes that would be carried out by the municipality. The studies were initiated by SCCOG with funding from ConnDOT.

- Eastern Connecticut Rail Feasibility Study: This study, undertaken by ConnDOT in 1997-1998, evaluated passenger rail service options on the NECR from New London to Palmer, Massachusetts, and on the P&W from Groton to Worcester, Massachusetts. Ridership projections, service plans, operating and capital costs, and station concepts were developed. The report recommended that high frequency service on the NECR from New London to Norwich be evaluated further, as is being done in this EIS.

- South County Commuter Rail Service Project: This study is being done by the Rhode Island Department of Transportation (RIDOT), and focuses on the implementation of commuter rail service between Providence and Westerly, Rhode Island. When this study is completed, it will include an operating plan, capital and operating costs, and potential station sites.

- Southeast Area Transit Study: In 1997, SEAT, with assistance from SCCOG, completed a strategic plan, *A System in Transition*. The new system would be designed to give area residents and visitors the opportunity to use transit by providing frequent service along major corridors to most major traffic generators. The plan would significantly upgrade existing SEAT service with an increased number of routes, expanded hours of operation, and more frequent headways. The plan was adopted by SEAT in 1997 but has not been implemented.

- Southeast Corridor Study: In 1998, ConnDOT initiated a study of the major transportation corridors in the southeastern portion of the state, including: I-95, Route 1, and the Shore Line East Rail Line. The purpose of the study was to assess transportation demands and needs in this portion of the state, assess the need and cost for maintenance and congestion relief, evaluate various alternatives, and identify fiscal resources. The

short-term recommendations included various transportation system management (TSM) strategies to ease traffic flow and address non-recurring congestion. The long-term recommendation was to increase capacity on I-95 by adding a third lane to all existing two-lane sections.

- Replacement of the Route 2A/117 Bridge – ConnDOT is proposing to replace the existing Route 2A/117 bridge over Indiantown Brook in Preston with a new structure that would widen the waterway opening and provide 2 travel lanes, 1.8 meter (6-foot) shoulders, and both left- and right- turn lanes onto Route 2.

1.4 Purpose and Need

The need for the Connecticut Route 2/2A/32 EIS grew out of the substantial increase in traffic and the associated congestion and safety impacts that have been experienced in southeastern Connecticut since the early 1990s.

1.4.1 Project Purpose Statement

The purpose of the Connecticut Route 2/2A/32 EIS project is to provide a safe and efficient transportation improvement solution to relieve traffic congestion and improve safety on the Route 2, 2A, and 32 corridors and associated state routes that intersect with Route 2.. The New England District of the ACOE, for purposes of Section 404, has adopted this as their "Basic Project Purpose".

1.4.2 1998 Existing Traffic Conditions

The analysis of existing conditions reveals that the key study area roadways have geometric, capacity, and safety deficiencies. The key study area roadways and their existing deficiencies are described below.

1.4.2.1 Description of Existing Roadways and Geometric Deficiencies

This section describes the existing roadways in terms of their cross sections and geometric deficiencies. Geometric deficiencies were determined by comparing the existing horizontal and vertical alignments of the key study area roadways to ConnDOT and AASHTO criteria for arterial highways in rural and urban areas. Information on the existing alignments was determined from ConnDOT route logs, topographical maps, and field

observations. More detailed information is provided in the *Engineering Evaluation Technical Report.* Copies of this report are available for review at Town Halls and public libraries within the study area, and at ConnDOT.

Route 2

West of the study area, between Hartford and Norwich, Route 2 is a four-lane, divided, limited-access highway. From Norwich to Westerly, Route 2 is a two-lane, undivided, rural state highway. Within the study area, posted speed limits range from 48.3 to 80.5 kilometers per hour (kph) (30 to 50 miles per hour (mph)). Roadway conditions vary along Route 2 with deteriorating pavement conditions and little to no shoulder on the southern portion in North Stonington, good pavement conditions and wide shoulders on the portion in Preston, and a more urban cross section through Norwich, where the road traverses a densely developed area.

Between Route 214 and I-95 in North Stonington, there are no horizontal curves that exceed the AASHTO / ConnDOT minimum criterion, although there are three sections that equal or approach the minimum. There are no vertical grade deficiencies on this portion of Route 2. However, there are locations where sight distance is restricted because of the roadway's vertical alignment, and where the stopping sight distances are less than the minimum criterion.

The portion of Route 2 in Preston between Route 164 and the proposed Route 2A Bypass (west of School House Road) is generally straight with no horizontal curves that exceed the maximum criterion. There is one location where the vertical grade exceeds ConnDOT's maximum criterion, and there are also locations where sight distance is restricted because of the roadway's vertical alignment, and where the stopping sight distances are less than the minimum criterion.

In Norwich, between the Shetucket River Bridge and the Preston town line, Route 2 has several horizontal curves that exceed the maximum criterion, and one location where the vertical grade exceeds ConnDOT's maximum criterion, and where the stopping sight distance is less than the minimum criterion.

Route 2A

West of the Thames River, Route 2A is a four-lane, divided, limited-access highway. At the Mohegan-Pequot Bridge, the road transitions to one lane in each direction. East of the bridge, Route 2A joins Route 12 and travels north-south for a short distance, then heads east to Route 2 as a two-lane undivided highway with unlimited access. This portion of Route 2A travels through the historic villages of Poquetanuck and Hallville. The roadway has narrow travel lanes and little to no shoulder. Roadways with narrow travel

lanes and little or no shoulder are not suited to accommodate high traffic volumes or large vehicles (trucks or buses), since they do not provide comfortable space between vehicles, and do not provide space for a disabled vehicle to stop without blocking traffic lanes. The capacity for such a roadway is low, and safety can be an issue especially in moderately developed areas. Posted speed limits on Route 2A range from 80.5 kph (50 mph) west of the Thames River to 25 mph (40.2 kph) through Poquetanuck.

Route 32

South of the I-395 Connector, Route 32 is a four-lane, divided highway with traffic signals at major intersections to allow left turns and U-turns. North of the I-395 Connector, Route 32 is a two-lane undivided state highway with a climbing lane on some steep sections and unrestricted access. Posted speed limits range from 40.2 to 72.4 kph (25 to 45 mph). Between the I-395 Connector and Route 2A, there is one horizontal curve that exceeds ConnDOT's maximum criterion, another location where the vertical grade exceeds the maximum criterion, and several locations where sight distance is restricted because of the roadway's vertical alignment, and where the stopping sight distances are less than the minimum criterion.

Route 164

Route 164 is a two-lane undivided state highway with narrow travel lanes and little to no shoulder. The posted speed limit is 48.3 kph (30 mph). Between Route 2 and Route 165, Route 164 is generally straight with no horizontal curves that exceed the AASHTO / ConnDOT minimum criterion. There is one location where the vertical grade exceeds the minimum criterion, and there are also locations where sight distance is restricted because of the roadway's vertical alignment, and where the stopping sight distances are less than the minimum criterion.

1.4.2.2 Capacity and Congestion

Two types of capacity analyses were conducted for existing conditions: one for roadways and one for signalized intersections. Both are intended to describe the quality of existing traffic flow within the study area. More detailed information is provided in the *Transportation Evaluation Technical Report*. This report is available for review at Town Halls and public libraries within the study area, and at ConnDOT.

Roadways

A planning-level capacity analysis was conducted for the study area roadways to determine where capacity deficiencies currently exist. Roadway capacity deficiencies occur when a roadway's capacity is unable to accommodate the traffic volume demands placed upon it. When conducting a capacity analysis, a peak hour is identified and analyzed. The peak hour represents the busiest hour of the day and can represent typical commuter peaks (morning or evening) or midday peaks (such as a Saturday) in retail or tourist areas. In this study area, the peak hour was established as a typical Friday afternoon when commuter traffic overlaps with casino-related traffic. Weekend traffic also represents a peak condition when tourist, beach, and casino-related traffic is heavy.

The planning-level capacity analysis involved several steps. First, 1997/1998 daily traffic counts were conducted. These counts were used to update the traffic counts performed in 1994 as part of the Route 2/2A/32 MIS. The 1997/1998 daily counts were then converted into hourly traffic volumes using a peak hour factor. A typical peak hour factor is 10 percent, meaning that traffic during the peak hour (the hour of the day when traffic volumes are highest) represents approximately 10 percent of the total daily traffic. The peak hour factors along Route 2, Route 164, and Route 214 were found to be approximately 8 percent. Peak hour factors on other roadways in the study area were found to be approximately 10 percent.

Next, capacities were assigned to the various roadway links. Capacity is a theoretical term based on a number of physical characteristics of the individual roadway, including the number and width of travel lanes, shoulder width, functional classification, terrain (grade and curvature), and the roadway's general environment (densely developed areas with multiple curb cuts, or rural areas with little development). Roadway capacity is defined as the maximum number of vehicles that can reasonably traverse a given section of roadway in a specified time period (usually one hour). For planning purposes, the capacities assigned to the study area roadways were considered to be approximate capacities, representative of typical roadway characteristics. The capacity of the roadways within the study corridors are depicted in Table 1-2 as the peak hour capacity.

Last, the hourly volumes were compared to the hourly capacities and a volume-to-capacity (V/C) ratio was calculated (the hourly volume divided by the hourly capacity).

Where V/C ratios are lower than 0.80, a roadway is considered to be operating under capacity with little or no delay experienced. V/C ratios between 0.80 and 1.00 indicate that a roadway is operating near, or at, capacity with vehicle delay becoming moderate to long. V/C ratios greater

than 1.00 indicate that a roadway is operating over capacity with severe congestion and excessive delays.[1]

Generally, when a roadway is operating below its capacity during peak hours, no improvements or travel demand reductions are warranted because the roadway is considered to be operating at an acceptable level of service. When traffic volumes approach a roadway's capacity (V/C between 0.80 and 1.00), significant delays are experienced with "stop and go" movements taking place along the roadway. When this occurs, any incident, such as a disabled car pulled onto the shoulder or inclement weather, is likely to reduce the roadway's capacity enough to produce excessive congestion and delay. When a roadway is at or over capacity, a breakdown in vehicle flow occurs.

Table 1-2 summarizes the results of the capacity analysis for existing conditions. Figure 1.4-1 graphically illustrates the existing volume-to-capacity ratios on various roadway segments. Roadways currently operating under their capacity are shown in green; roadways operating near capacity are shown in yellow; and roadways operating over capacity, with congestion and delays, are shown in red.

As shown in Figure 1.4-1, nearly the entire length of Route 2 is operating close to or over capacity during peak periods with the most severe deficiencies occurring between Route 164 and Route 214 adjacent to Foxwoods; between Route 201 and Route 184 in North Stonington; and south of I-95. Three other portions of Route 2 within the study area are approaching capacity: between Route 2A and Route 164; between Route 214 and Route 201; and between Route 184 and I-95. Since the Route 2/2A/32 MIS traffic count program in 1994, Route 2 has seen an increase of up to 5,200 vehicles per day (vpd), depending on the location.

[1] Highway Capacity Manual, Special Report 209, Third Edition, Transportation Research Board, 1994.

Table 1-2
Existing Volume-to-Capacity Summary (1997-1998)

Location	Number of Lanes	Daily Traffic Volume	Peak Hour Volume	Peak Hour Capacity	V/C Ratio	Relation-ship to Capacity
Route 2 between I-95 and Route 184	2	19,700	1,576	1,800	0.88	Near
Route 2 between Routes 184 and 201	2	24,400	1,952	1,800	1.08	Over
Route 2 between Routes 201 and 214	2	22,400	1,728	1,800	0.96	Near
Route 2 between Routes 214 and 164	2	27,400	2,192	2,000	1.10	Over
Route 2 between Routes 164 and 2A	2	22,200	1,776	2,000	0.89	Near
Route 2 between Routes 2A and 165	2	13,550	1,084	1,400	0.77	Under
Route 2A at Mohegan-Pequot Bridge	2	23,250	2,325	2,600	0.89	Near
Route 2A through Poquetanuck Village	2	12,400	1,240	1,400	0.89	Near
Route 32 north of I-395 Connector	2	14,300	1,430	1,800	0.79	Under
Route 164 north of Route 2	2	10,300	824	1,400	0.74	Under
Route 214 between Route 117 and Shewville Rd.	2	6,100	488	1,000	0.49	Under

Traffic volumes on Route 2A have increased substantially between 1994 and 1998. Traffic volumes have increased 23 percent on the Mohegan-Pequot Bridge, and 20 percent through Poquetanuck Village since 1994. As a result of these increases, the two-lane segments of Route 2A are currently operating near capacity.

Route 32 continues to operate under capacity. The segment between the I-395 Connector and Route 2A has experienced a 16 percent increase since 1994. The opening of the Mohegan Sun Resort is partially responsible for this increase in traffic.

Route 214 has also experienced substantial traffic growth since 1994. However, most of the roadway is still under capacity, except the segment just south of Route 2 and adjacent to Foxwoods. This section of Route 214 experiences heavy volumes turning in and out of the resort's driveways.

Signalized Intersections

To quantify operations at signalized intersections along the Route 2, Route 2A, Route 32, and Route 164 corridors, intersection level of service analysis was conducted at eighteen signalized intersections in the study area.

Levels of service for signalized intersections are calculated using the operational analysis methodology of the *Highway Capacity Manual*.[2] This method assesses the effects of signal type, timing, phasing and progression, vehicle mix, and geometry. Six levels of service are defined with letter designations from A to F with level-of-service A representing the best operating conditions, and level-of-service F representing the worst. Level-of-service C describes a condition of stable traffic flow and is generally considered the minimal desirable level for peak traffic flow in rural and urban areas. Level-of-service D, which entails greater vehicle queues and delays, is generally considered acceptable for urban areas because of the increasing cost and difficulty of making improvements necessary to provide level-of-service C operations. Level of service designations are based on the criterion of calculated average stopped delay per vehicle. Table 1-3 summarizes the relationship between level of service and delay.

Table 1-3
Level-Of-Service Criteria For Signalized Intersections

Level of Service	Stopped Delay per Vehicle (sec)
A	less than 5.0
B	5.1 to 15.0
C	15.1 to 25.0
D	25.1 to 40.0
E	40.1 to 60.0
F	greater than 60.0

Source: Highway Capacity Manual, Special Report 209, Transportation Research Board, Washington, DC, 1994.

Table 1-4 summarizes the results of the level of service analysis for the key study area intersections, based on the average stopped delay (averaged over all legs of the intersection). As shown, all of the study area intersections are operating at level-of-service A or B under current conditions. This is primarily because many of the signalized intersections in the study area have already been upgraded to provide left turn lanes. The presence of left-turn lanes has two effects. First, the turn lanes allow drivers to turn from the main road to a side street more easily, decreasing the delay for turning vehicles. Second, the left-turn lanes separate turning vehicles from through vehicles, reducing the delay and queues for through vehicles as well. Third, the turn lanes allow for the design of efficient signal phasing and timing. Therefore, overall delay at the intersection is reduced, and level of service is improved.

Another reason for the high levels of service at these intersections is that the side streets have relatively low traffic volumes, compared to the volumes on

[2] Highway Capacity Manual, Special Report 209, Third Edition, Transportation Research Board, 1994.

the main road. When this happens, the traffic signal for the main road can remain green for longer periods of time. This reduces overall intersection delay, thereby resulting in a higher level of service. However, delays for side street access and egress can be long when the intersection signal is designed to accommodate heavy through volumes. Turning movements at signalized study intersections of particular difficulty and longer delays and queues include:

- Route 2 at I-95 Frontage Road (SF 617): The Route 2 westbound left turn onto the I-95 southbound on-ramp operates at Level-of-Service D.
- Route 2 at Route 164: The Route 2 westbound through movement operates at Level-of-Service D.
- Route 2 at Route 2A / Route 117 and Paster Road: The left turn from Route 2A / Route 117 onto Route 2 northbound operates at Level-of-Service D.
- Route 32 at Fitch Hill Road: The northbound left turn from Route 32 onto Fitch Hill Road operates at Level-of-Service D.
- Route 32 at Route 163 and Depot Road: The Route 32 eastbound through movement operates at Level-of-Service D.

Unsignalized Intersections

The previous section quantified operations at signalized intersections in the study area. Operations at unsignalized intersections in the study area were not quantified. However, this section describes qualitatively the conditions experienced at unsignalized intersections.

At unsignalized intersections, drivers on the main road attempting to make left turns must wait until there is a gap in approaching traffic. As traffic volumes on the main road increase, both the number of gaps and the size of the gaps decrease. This makes it more difficult for drivers to make left turns. On high volume roads, left turning vehicles face longer delays as they wait for a large enough gap to make the turn safely. Under extreme conditions, drivers may make unsafe maneuvers as they force themselves into small gaps in the traffic stream. Making a right turn from the main road to a side street is not as difficult as making a left turn, because there is no conflicting traffic.

Table 1-4
Existing Signalized Intersection Level of Service

Location	Level of Service	Delay (Seconds)*	V/C Ratio
Route 2 at I-95 Northbound On-Ramp	B	9.5	0.65
Route 2 at I-95 Frontage Road (SR 617)	B	9.0	0.56
Route 49 at I-95 Frontage Road (SR 617)	B	14.3	0.35
Route 2 at Rocky Hollow Road and Wyassup Road	B	7.3	0.53
Route 2 at Main Street and Mystic Road (SR 627)	B	14.6	0.72
Route 2 at Mains Crossing (Route 201)	A	4.5	0.51
Route 2 at Cossaduck Hill Road (Route 201)	B	6.1	0.44
Route 2 at Route 214	B	9.2	0.52
Route 2 at Route 164	B	14.3	0.71
Route 2 at Route 2A/Route 117 and Paster Road	B	13.8	0.74
Route 2A at Route 117 and Lincoln Park Road	B	7.6	0.32
Route 2A at Route 12 (Norwich State Hospital)	B	9.4	0.42
Route 2A at Route 12 (Mohegan-Pequot Bridge)	B	12.3	0.56
Route 164 at Route 165	B	7.3	0.52
Route 32 at Fitch Hill Road	B	13.8	0.50
Route 32 at Route 2A Westbound Ramps	B	8.7	0.47
Route 32 at Route 2A Eastbound Ramps	B	8.9	0.39
Route 32 at Route 163 and Depot Road	B	7.6	0.48

* Delay is the average stopped time at the intersection, averaged over all legs.

Drivers on a side street trying to cross or turn left onto the main road encounter conflicting traffic from two directions, making it much more difficult to find a reasonable gap in traffic. As traffic volumes on the main road increase, drivers on the side street face longer delays and frustration, and in extreme conditions, may block oncoming traffic in one direction while they wait for a gap in the other direction. These types of maneuvers become much more common as traffic volumes on the main road increase.

Drivers on a side street trying to cross or turn left onto the main road encounter conflicting traffic from 2 directions, making it much more difficult to find an acceptable safe gap in traffic. As traffic volumes on the main road increase, drivers on the side street face longer delays and frustration, and, in extreme conditions, may block oncoming traffic in one direction while they wait for a gap in the other. These types of maneuvers become much more common as traffic volumes on the main road increase and can result in significant safety issues especially on high speed roadways or locations with poor visibility or sight distance.

1.4.2.3 Safety Analysis

A planning-level safety analysis was conducted for the key study area roadways to determine if the traffic volume increases or the geometric conditions of these roadways have resulted in unsafe operating conditions. This safety analysis was based on an examination of accident rates on the study area roadways and a comparison of statewide averages. The source of the data is the most recent ConnDOT Traffic Accident Surveillance Report (TASR) database for the period between 1993 and 1995. The purpose of the planning-level safety analysis was to identify the areas where safety issues or problems exist, not to investigate the exact nature of the problems at each location. ConnDOT's TASR database provides sufficient detail for such an analysis.

The TASR database compiles statewide accident data on a three-year basis and calculates the actual accident data for every roadway link and intersection on state numbered roadways. It then calculates a critical accident rate for each location based upon roadway or intersection type, the traffic volume and the vehicle miles of travel on the roadway. The ratio of the actual accident rate to the critical accident rate is then determined. If this ratio is greater than one, the rate of accident occurrence at that location is said to be "higher than expected."

The results are broken into two categories. The first category contains those locations where the ratio of the actual accident rate to the critical rate is greater than one, or the "higher than expected" locations. The second category contains those locations where this ratio is greater than one and the number of accidents over the three-year period is greater than 14. The locations in the second category meet the criteria to be placed on ConnDOT's Suggested List of Surveillance Study Sites (SLOSSS). Locations on the SLOSSS are given priority for funding of future safety improvement projects. The "higher than expected" locations are not considered to be as critical as the SLOSSS locations.

Figure 1.4-2 presents the results of the safety analysis for the three-year period from 1993 to 1995. The figure portrays all SLOSSS locations and all "higher than expected" locations. Figure 1.4-2 shows general areas where there are a number of high accident rate locations. For example, Route 32 has a cluster of high accident rate locations near Route 163 and again at the Route 2A ramps. Route 2A has a cluster of high accident rate locations at Route 12 between the Mohegan-Pequot Bridge and the Norwich State Hospital site. Along Route 2, there are high accident rate locations near Route 2A, at Route 164, and at the intersections of Mains Crossing, Mystic Road, and Rocky Hollow Roads in North Stonington. There is also a cluster of high accident rate locations at Route 2 and Route 214 adjacent to Foxwoods.

Route 214 has more high accident rate locations than other roadways in the area, most likely a result of its rural character and narrow cross section,

combined with high travel speeds. Other roadways with a high number of high accident rate locations include Routes 2 and 12 through downtown Norwich, and 3 locations on Route 117 (at Route 184, at Route 214, and south of Route 2A).

1.4.2.4 Operational Issues

The three previous sections discussed and analyzed the existing geometric, capacity, and safety conditions on key study area roadways. These analyses used standard traffic engineering techniques to determine where deficiencies exist based on quantitative measures. There are also operational issues and problems on these roadways that may not have manifested themselves into geometric, capacity, or safety deficiencies. Examples of operational issues include dramatic increases in traffic volumes, excessive travel speeds, cut-through traffic, an abundance of bus traffic, lack of adequate shoulder width, poor access management along a corridor, general safety concerns, and a change in a roadway's character or use. These operational issues and their effects are briefly discussed below.

Excessive travel speeds on major roadways make it increasingly difficult for motorists to enter and exit side streets and driveways. Excessive travel speeds and high traffic volumes also make it difficult for motorists to make left turns to or from the main road. The increase in bus traffic since the casinos opened has placed substantial demands on roadways that were not designed to handle large numbers of heavy vehicles. Route 2, Route 2A, and Route 164, in addition to several of the secondary roads, have seen large increases in bus traffic. The lack of shoulders on study area roadways is not just a geometric concern. It can also constrain capacity and decrease safety when there is not sufficient room for a disabled vehicle to pull off the road. Each of the study area corridors has experienced these types of operational issues to some degree since the early 1990s.

1.4.3 Future Economic Development

Future economic development in the region is expected to place increased travel demands on the roadway system. In 1995, as part of the MIS, each of the study area municipalities participated in a "land use vision" exercise, whose purpose was to identify recent and planned development, and expected or speculated growth areas over the next 5 to 10 years. Representatives from each municipality worked with their local boards to identify areas where growth was and was not likely to occur. The exercise was intended to identify a likely level of development. Three major growth areas were identified in 1995, including Foxwoods Resort Casino, the Mohegan Sun Resort, and the I-95 Exit 92 interchange.

In 1998, at the start of the EIS, the original "land use vision" exercise was updated through written and verbal communication with the cities and towns. One new major growth area, the Norwich State Hospital site, was identified in 1998. The major anticipated growth areas are described below and shown in Figure 1.4-3.

1.4.3.1 Foxwoods Resort Casino and Route 2 Commercialization

As noted earlier, the Foxwoods Resort Casino is a major economic development and traffic generator. The resort employs over 11,000 people and attracts more than 50,000 visitors per day. Recent development at the resort includes the Grand Pequot Tower, with approximately 1,000 hotel rooms, and the new tribal cultural museum. Additional employment growth and patron growth are expected at Foxwoods, although at a slower rate than that experienced in the 1990s. Continued commercialization of the Route 2 corridor in Preston, North Stonington, and Stonington is also expected. These developments will continue to increase traffic demands on Route 2, Route 2A, Route 164, and other area roadways.

1.4.3.2 Mohegan Sun Resort and Spin-Off Development

In October 1996, the Mohegan Tribe opened a gaming resort on reservation land in Montville. Currently, the resort employs over 5,000 employees and attracts more than 20,000 visitors per day. In 1998, the tribe announced plans that would double the size of the resort and include additional gaming space, as well as hotel and retail space on the reservation. Spin-off hotel and retail development is also expected in Montville near the reservation. These developments will increase traffic demands on Route 2A, Route 32, and other area roadways. The Mohegan Tribe is proposing modifications to access from Route 32, and other roadway improvements, as part of the proposed expansion.

1.4.3.3 I-95 Exit 92 interchange

The Exit 92 area was identified as a likely growth area in 1995 by the Towns of North Stonington and Stonington. In 1996, Time Warner announced plans to pursue the development of a "Six Flags" theme park at Exit 92 on land owned by the Mashantucket Pequot Tribe. During the EIS scoping process, it was assumed that the EIS would include an analysis of a theme park as part of future conditions. However, the plans for a theme park in southeastern Connecticut have since been withdrawn and the EIS does not analyze a theme park.

Despite the lack of specific plans for the area, Exit 92 is still expected to see development in the future because of its key location on I-95 and its proximity to the region's other attractions. One million square feet is thought to be a reasonable level of development near the interchange, therefore this level of development has been programmed into the assessment of future conditions. Likely land uses have been identified as hotel, commercial, retail, and entertainment uses. Development at this interchange would increase traffic demands on I-95, Route 2, and other roadways near the interchange.

1.4.3.4 Norwich State Hospital

The former Norwich State Hospital site, located in Norwich and Preston, is owned by the State of Connecticut. In 1997, the State closed the hospital and initiated a study to identify alternate uses for the site. A re-use / marketing plan was developed by a consultant and released in September 1998.[3] The plan potentially includes the relocation of Three Rivers Community Technical College from its three Norwich locations to the state hospital site, and redevelopment of remaining portions of the site. Likely uses on the rest of the site were based on an analysis of the supply of and demand for various land uses in the region. Hotel / hospitality uses, conference center, ancillary retail, and ancillary recreational / entertainment uses were identified as the most likely uses of the site. Redevelopment of the state hospital site will increase travel demands on Route 2A and Route 12. The state has solicted development proposals for the state hospital site.

1.4.3.5 Other Development

Other likely future development identified in southeastern Connecticut includes redevelopment in the urban areas of Norwich, New London, and Groton; Pfizer's expansion in Groton and New London; the Mercantile Exchange project in Norwich; and development at the I-95 Exit 88, Exit 89, and Exit 90 interchanges.

There is also potential for additional casino development in the region if either the Eastern Pequots or the Eastern Pawcatuck Pequots succeed in their bids for federal recognition. However, at this time, neither tribe has received federal recognition, and the potential location(s) of reservation land or casino development remains undetermined. Therefore, the Route 2 / 2A / 32 EIS does not include additional casino development other than known expansions at the Foxwoods Resort Casino and the Mohegan Sun Resort.

[3] Norwich State Hospital Marketing Plan, prepared for the State of Connecticut by CB Richard Ellis, September 10, 1998.

1.4.4 2020 Future Traffic Conditions

The 2020 future traffic volumes were generated using the Connecticut statewide travel demand forecasting model. The planned roadway improvements described in Section 1.3.3 and expected economic development described in Section 1.4.3 were incorporated into the model to account for any possible changes in travel patterns associated with such improvements and changes. *The Transportation Evaluation Technical Report* provides more detail.

1.4.4.1 Traffic Volume Growth, 1998-2020

Table 1-5 presents the traffic volume growth projected between 1998 and 2020.

Substantial growth in traffic volumes is expected to continue along many study area roadways. On Route 2 through North Stonington, traffic volumes are expected to increase by approximately 10,000 vpd. Traffic volumes on Route 2 through Preston are expected to increase by approximately 5,000 vpd. Traffic volume growth on Route 2 is attributable to the continued growth at Foxwoods, commercialization of the Route 2 corridor, and growth at the Exit 92 area, as well as general traffic growth throughout the region.

Traffic volume increases on Route 2A are expected to be approximately 50 percent. This growth is attributable to expansion at the Mohegan Sun Resort, continued growth at Foxwoods, and the re-use of the Norwich State Hospital site, as well as regional traffic growth.

Traffic volumes on Route 32 are expected to increase by approximately 3,000-4,000 vpd. Traffic volume increases on Route 164 are similar to those expected on the portion of Route 2 through Preston (5,000 vpd). Traffic volume increases on Route 214 are similar to those expected on Route 2A (approximately 50 percent) and reflect the continued use of Route 214 as an alternative route to and between the casinos.

Table 1-5
Projected Traffic Volume Growth, 1998-2020

Location	1998	2020	Projected Traffic Increase 1998-2020	Projected % Change 1998-2020
Route 2 between I-95 and Route 184	19,700	29,300	9,600	49%
Route 2 between Routes 184 and 201	24,400	35,200	10,800	44%
Route 2 between Routes 201 and 214	22,400	31,900	9,500	42%
Route 2 between Routes 214 and 164	27,400	40,100	12,700	46%
Route 2 between Routes 164 and 2A	22,200	27,200	5,000	23%
Route 2 between Routes 2A and 165	13,550	18,600	5,050	37%
Route 2A at Mohegan-Pequot Bridge	23,250	35,300	12,050	52%
Route 2A through Poquetanuck Village	12,400	18,500	6,100	49%
Route 32 north of I-395 Connector	14,300	17,700	3,400	24%
Route 164 north of Route 2	10,300	14,500	4,200	41%
Route 214 between Route 117 and Shewville Rd.	6,100	10,900	4,800	79%

In addition to the roadways shown in Table 1-5, other roadways in southeastern Connecticut are expected to see traffic growth. Secondary roads like Shewville Road, Lantern Hill Road, and Route 117 are also expected to carry additional traffic volumes, primarily due to the fact that Route 2 is projected to be operating well above its capacity with frequent and severe traffic congestion. Motorists are expected to seek other routes to avoid this congestion, as is happening to a lesser extent today. This trend of spreading out onto secondary and alternative routes is expected to continue as congestion worsens along the major routes within and providing access to the study area.

1.4.4.2 Capacity and Congestion

As was done for existing conditions, two types of capacity analyses were conducted for future conditions: one for roadways and one for signalized intersections. The analysis of future conditions reveals that the study area roadways are expected to have capacity deficiencies, and that these deficiencies will worsen over time if no action is taken. Operations at signalized intersections are also expected to worsen in the future.

Roadways

V / C ratios were calculated using the 2020 peak hour traffic volumes to determine the locations where capacity deficiencies are projected to occur in the future. Table 1-6 and Figure 1.4-4 present a summary of the V / C comparison for the 2020 future condition.

Table 1-6
2020 Volume-to-Capacity Summary

Location	Number of Lanes	2020 Average Daily Traffic Volume	Peak Hour Volume	Peak Hour Capacity	V/C Ratio	Relation-ship to Capacity
Route 2 between I-95 and Route 184	2	29,300	2,345	1,800	1.30	Over
Route 2 between Routes 184 and 201	2	35,200	2,815	1,800	1.56	Over
Route 2 between Routes 201 and 214	2	31,900	2,550	1,800	1.42	Over
Route 2 between Routes 214 and 164	4	40,100	3,211	4,000	0.80	Under
Route 2 between Routes 164 and 2A	2	27,200	2,177	2,000	1.09	Over
Route 2 between Routes 2A and 165	2	18,600	1,486	1,400	1.06	Over
Route 2A at Mohegan-Pequot Bridge	2	35,300	3,527	2,600	1.36	Over
Route 2A through Poquetanuck Village	2	18,500	1,852	1,400	1.32	Over
Route 32 north of I-395 Connector	2	17,700	1,766	1,800	0.98	Near
Route 164 north of Route 2	2	14,500	1,157	1,400	0.83	Near
Route 214 between Route 117 and Shewville Rd.	2	10,900	872	1,000	0.87	Near

As shown, the entire portion of Route 2 within the study area is expected to operate above its capacity except on Route 2 between Route 164 and Route 214. The portions of Route 2 already programmed for improvements (from Route 164 to Route 214, and south of I-95) are expected to operate below capacity as a result of the improvements. Route 2A is also expected to operate above capacity. The study area segments of Route 32 and Route 164 are expected to be approaching capacity.

Secondary roadways such as Shewville Road, Lantern Hill Road, Route 201, and Route 117 are projected to operate under capacity while Route 214 will be near capacity in 2020. However, as discussed in the previous section, traffic volume growth on these roads is expected to be substantial, resulting in operational issues, safety issues, and potential changes in the roadways' rural / residential character.

Signalized Intersections

Intersection level of service analysis was conducted at the 18 study area signalized intersections using the traffic volumes expected in the future. Table 1-7 summarizes the results of the level of service analysis for the key study area intersections, and compares existing to projected 2020 intersection level of service.

Table 1-7
1998 and 2020 Signalized Intersection Level of Service

Location	1998 Existing Conditions			2020 Future No-Action Conditions		
	Level of Service	Delay (Seconds)	V/C Ratio	Level of Service	Delay * (Seconds)	V/C Ratio
Route 2 at I-95 Northbound On-Ramp	B	9.5	0.65	D	27.9	0.96
Route 2 at I-95 Frontage Road (SR 617)	B	9.0	0.56	C	16.7	0.80
Route 49 at I-95 Frontage Road (SR 617)	B	14.3	0.35	C	15.1	0.43
Route 2 at Rocky Hollow Road and Wyassup Road	B	7.3	0.53	C	16.6	0.77
Route 2 at Main Street and Mystic Road (SR 627)	B	14.6	0.72	F	>60.0	>1.20
Route 2 at Mains Crossing (Route 201)	A	4.5	0.51	B	7.7	0.72
Route 2 at Cossaduck Hill Road (Route 201)	B	6.1	0.44	B	12.5	0.67
Route 2 at Route 214	B	9.2	0.52	B	11.5	0.73
Route 2 at Route 164	B	14.3	0.71	B	10.3	0.63
Route 2 at Route 2A/Route 117 and Paster Road	B	13.8	0.74	D	30.0	0.99
Route 2A at Route 117 and Lincoln Hill Road	B	7.6	0.32	B	12.7	0.56
Route 2A at Route 12 (Norwich State Hospital)	B	9.4	0.42	C	15.8	0.61
Route 2A at Route 12 (Mohegan-Pequot Bridge)	B	12.3	0.56	C	21.3	0.84
Route 164 at Route 165	B	7.3	0.52	B	8.4	0.63
Route 32 at Fitch Hill Road	B	13.8	0.50	C	19.9	0.64
Route 32 at Route 2A Westbound Ramps	B	8.7	0.47	B	12.2	0.82
Route 32 at Route 2A Eastbound Ramps	B	8.9	0.39	B	9.9	0.57
Route 32 at Route 163 and Depot Road	B	7.6	0.48	F	>60.0	>1.20

* Delay is calculated as the average stopped delay, averaged across all legs of the intersection

As shown in Table 1-7, the level of service at 11 of the 18 signalized intersections in the study area is expected to deteriorate as a result of the increased traffic volumes. All of the intersections but one are expected to experience longer delays and higher V/C ratios in the future. The exception to deteriorating level of service is the intersection of Route 2 and Route 164, which will be improved as part of the planned widening of Route 2 east of Route 164.

Two intersections are anticipated to operate at level-of-service F under future conditions. An intersection operating at level-of-service F is said to be "failing," which means that there are long delays and long queues of vehicles waiting to get through the intersection. Drivers often have to sit through more than one cycle of the traffic signal before getting through intersections operating at this level. Five additional intersections are expected to have V/C ratios greater than 0.80. These high V/C ratios indicate intersection

operations that are approaching capacity with little excess capacity and limited ability to handle additional traffic.

As discussed earlier, many of the signalized intersections in the study area have already been upgraded to provide left turn lanes. These turn lanes help reduce overall delay at the intersections. Although the traffic volumes on the main roads are expected to increase substantially by the year 2020, traffic volumes on the side streets are expected to remain relatively low. Therefore, many of the signalized intersections are anticipated to operate at reasonable overall levels of service. Delays for side streets, however, will increase as the through traffic volume grows. In addition, left turns onto side streets and into driveways will become more difficult as vehicles need to cross a heavy stream of oncoming traffic. These situations create long delays, queues, and unsafe conditions for many of the side street movements at intersections.

The two intersections projected to have failing operations are Route 2 at Main Street and Mystic Road in North Stonington, and Route 32 at Route 163 and Depot Road in Montville. At the Route 2 intersection, vehicles turning left off Route 2 to the side streets will face lengthy delays waiting to turn because of the high volume of through vehicles on Route 2. At the Route 32 intersection, eastbound vehicles turning from Route 163 to Route 32 will face lengthy delays waiting to turn. Neither intersection currently has left turn lanes.

Unsignalized Intersections

Operating conditions at unsignalized intersections in the study area are also expected to worsen in the future. As discussed in Section 1.4.2.2, as traffic volumes on the main road increase, both the number of gaps in the traffic stream and the size of the gaps decrease, making it more difficult for drivers to turn to or from the main road. On high volume roads, left turning vehicles face long delays as they wait for a gap, and under extreme conditions, drivers may make unsafe maneuvers as they force themselves into small gaps in the traffic stream. These types of maneuvers are expected to become more common in the future and, as main road volumes increase, accident frequency is expected to increase.

1.4.4.3 Safety

As traffic volumes increase on the study area roadways, the number of accidents is also likely to increase. Increased traffic volumes lead to increased congestion, which interrupts normal traffic flow, leads to a greater number of vehicle conflicts, and tends to result in a greater number of accidents, especially turning on and off roadways and into and out of driveways. This trend is seen under existing conditions, and is expected to continue in the future. In the future, without improvements, additional study area roadway links and intersections are likely to have “higher than expected” accident

rates, or to be added to the SLOSSS. Existing SLOSSS locations may also worsen. In addition, as traffic continues to spread to back roads like Route 214, Route 201, and others to avoid congested conditions on Route 2, these back roads are likely to experience a deterioration in safety as well.

1.4.5 Summary of Needs

The analysis of existing and future conditions reveals that the study area has and is expected to continue to experience substantial traffic volume growth on both major and secondary roadways. Recent development at the region's two casinos has imposed increasing demands on the roadways serving the Region. Continued growth at the casinos and at other development nodes throughout the region will increase these travel demands and will tend to spread them to other arterial and secondary roadways.

Specific needs along the Route 2, Route 2A, Route 32, and Route 164 corridors are discussed below.

1.4.5.1 Route 2

Route 2 is heavily relied upon to provide access to southeastern Connecticut from outside the region. It has long experienced periods of traffic congestion between Norwich and Westerly (RI), primarily associated with summer weekend beach traffic. These periods of congestion have become worse and more frequent with the development of the Foxwoods Resort Casino. This trend is evident in the examination of traffic volumes on Route 2, which have more than doubled since the early 1990s, and are expected to increase by another 50 percent by the year 2020.

Route 2 also has existing geometric deficiencies and safety problems. Documented geometric deficiencies include sharp curves, steep grades, and locations where stopping sight distances are less than ConnDOT's standards. Safety problems are found at and near the intersections of Route 2A, Route 164, Route 214, Mains Crossing, Mystic Road, Rocky Hollow Road, Route 49, and Route 78.

The projected traffic volume increases, combined with existing geometric deficiencies, are expected to result in severe congestion, lengthy delays, and a further deterioration in safety on Route 2. The entire length of Route 2 from Norwich to I-95 is projected to operate over capacity, with the exception of the segment between Route 164 and Route 214 that will have been widened by the Mashantucket Tribe. Therefore, improvements to Route 2 are needed to improve safety, and either reduce the demands on Route 2 or increase its capacity.

1.4.5.2 Route 2A

With the limited opportunities for east-west traffic movement across the Thames River, traffic volumes on Route 2A have nearly doubled since the early 1990s, and are expected to increase by another 50 percent by the year 2020. Continued expansion at the Mohegan Sun Resort, spin-off development in Montville and Preston, and expected redevelopment at the Norwich State Hospital site are all expected to place increased travel demands on Route 2A. The traffic volume increases are expected to result in severe congestion, lengthy delays, and a deterioration in safety on Route 2A. In the future, Route 2A is projected to operate above capacity.

During the Route 2/2A/32 MIS, it was determined that widening or upgrading Route 2A was not a feasible option given the severe environmental constraints along the corridor and the number of homes immediately adjacent to the roadway. In addition, the regional through traffic and bus traffic traveling on Route 2A to and from the casinos conflict with local traffic and pedestrian movements in the village centers. Therefore, improvements that reduce demand on Route 2A are warranted.

1.4.5.3 Route 32

Based on a review of traffic volumes, Route 32 has been little affected to date by the development of the region's two casinos. In the early 1990s, after the opening of Foxwoods, traffic volumes on Route 32 remained stable while volumes on roads east of the Thames River rose substantially. Since the opening of the Mohegan Sun Resort, volumes have increased only slightly (up 16 percent between 1994 and 1998), principally because Route 2A provides primary access to the resort. Route 32 continues to operate near capacity.

Route 32 does have existing geometric and safety deficiencies. Documented geometric deficiencies include sharp curves and steep grades, and locations where stopping sight distances are less than ConnDOT's standards. Safety problems are found at the Route 2A ramps and throughout southern Montville, both north and south of the intersection of Route 163.

In the future, as additional development is completed at the Mohegan Sun Resort and spin-off development spreads to Route 32, the roadway will likely experience additional travel demands. Between 1998 and 2020, traffic volumes on Route 32 are projected to increase by approximately 25 percent, and the roadway is expected to be operating very close to capacity. As a result, improvements are needed to maximize the use of existing capacity and improve safety on Route 32.

1.4.5.4 Route 164

For motorists from the north, Route 164 is a preferred route to reach Foxwoods and eastern portions of the study area because it is shorter than other routes. As a result, traffic volumes on Route 164 have doubled since the early 1990s. Under existing conditions, Route 164 is operating below capacity.

Route 164 does have existing geometric deficiencies and safety problems. Documented geometric deficiencies include a section where the profile grade is steep , and other locations where stopping sight distances are less than ConnDOT's standards. Safety problems are found at the intersection of Route 2.

Between 1998 and 2020, traffic volumes on Route 164 are projected to increase by approximately 40 percent, and the roadway is expected to be approaching capacity. As a result, improvements are needed to improve safety on Route 164.

1.4.5.5 Other Roadways

Congestion on major roadways in the study area is forcing traffic onto secondary roads. This is evident from an examination of traffic volumes on secondary roadways. These secondary roads have experienced substantial increases in traffic volumes, resulting in safety concerns and numerous operational issues such as excessive travel speeds, cut-through and bus traffic, noise, and a change in the roadway's character and use. Without regional infrastructure improvements, these secondary roads are likely to be increasingly used by motorists and large vehicles (particularly buses) attempting to bypass congestion on the major roadways.

1.4.5.6 Conclusions

The previous sections reveal that traffic volumes are projected to meet or exceed the capacities along the key corridors by the year 2020. The transportation infrastructure is not adequate to handle the demands placed upon it today, and it will be more insufficient by the year 2020.

Several alternatives have been developed that are intended to reduce travel demands or traffic volumes on these corridors, increase the capacity of these corridors to meet the projected demand, and / or improve safety on the corridors. These alternatives, and their anticipated impacts, are the subject of this Draft EIS.

1.5 Consistency with State, Regional, and Local Plans

The State Policies Plan for the Conservation and Development of Connecticut (1998-2003) was established by the Connecticut General Assembly in accordance with sections 16a-24 through 16a-33 of the General Statutes. The Plan describes policy and planning guidelines for decisions which affect growth and development in the state. This plan serves as a guide to state agencies in planning infrastructure investments and public expenditures. The plan proposes that traffic flow improvements on existing highways are preferred alternatives to the construction of new highways, with the intention that the capacity and safety of existing highways be protected and improved. The plan also notes that rapid growth in the southeastern Connecticut tourism and casino industries has strained the capacity of several state-numbered routes in that region.

This project is consistent with several of the specific transportation policies listed in the Plan:

- Maintain the condition of, and encourage efficient use of, existing transportation systems and support alternatives to single-occupancy vehicle use
- Evaluate arterial roads that are either over capacity or approaching capacity, and determine systemwide improvements needed to maximize the efficiency of the existing system and improve vehicle flows
- Expand the state's integrated transportation system, in accordance with available public resources, where justified by the need for improved safety, choice of mode, mobility and convenience

The project is also consistent with goals and policies stated in the Southeastern Connecticut Council of Governments' (SCCOG) 1997 Plan, specifically the need to develop a balanced regional transportation system that strives to meet the needs of all segments of the population, including visitors, and which promotes development within the region's core. The Plan also notes the need to recognize fiscal constraint in developing regional transportation systems and to expand opportunities for multimodal linkages among various elements of the transportation system.

The project's consistency with the Connecticut Coastal Area Management Plan is described in Chapter 6 of this Draft EIS.

Plans of Development prepared by many of the municipalities within the study area also establish as goals the need to preserve the capacity of existing roadways, to maintain adequate traffic service levels on existing roads, and to encourage traffic to use and remain on arterial roads rather than collector or

local access roads. The Route 2/2A/32 study is consistent with these local plans.

1.5.1 Alternative A

Alternative A is not consistent with any state or local plans, as it would not result in any improvement of the existing transportation system or transportation conditions.

1.5.2 Alternative B

Alternative B is consistent with several municipal and regional planning goals and objectives. Specifically, it is consistent with New London's goals of improving the utilization of the City's multimodal transportation system, and encouraging the improvement of railroad services. This alternative is also consistent with Montville's policy goals of more efficient use of existing facilities, increasing alternative modes of transportation, and the continuation of rail services. Waterford's plan also encourages a full range of transportation modes. The upgrade of Route 2 in North Stonington is consistent with that town's goal of addressing needed improvements to Route 2 intersections and safety improvements to Route 2. Due to the impacts to Ledyard's Whitehall Park, this alternative is not consistent with Ledyard's goal of protection of trails and open space.

1.5.3 Alternative C

Alternative C is consistent with several municipal and regional planning goals and objectives. Specifically, it is consistent with New London's goals of improving the utilization of the City's multimodal transportation system, and encouraging the improvement of railroad services. This alternative is also consistent with Montville's policy goals of more efficient use of existing facilities, increasing alternative modes of transportation, and the continuation of rail services. Waterford's plan also encourages a full range of transportation modes. The upgrade of Route 2 in North Stonington is consistent with that town's goal of addressing needed improvements to Route 2 intersections and safety improvements to Route 2. Due to the impacts to Ledyard's Whitehall Park, this alternative is not consistent with Ledyard's goal of protection of trails and open space.

1.5.4 Alternative D

Alternative D is consistent with planning goals of the City of Norwich, specifically to improve existing streets. The upgrade of Route 2 in North Stonington is consistent with that town's goal of addressing needed improvements to Route 2 intersections and safety improvements to Route 2.

1.5.5 Alternative E

Alternative E is consistent with several municipal and regional planning goals and objectives. Specifically, it is consistent with Norwich's goal to direct summer beach traffic around the city, and with Waterford's goal of improving Route 32. This alternative is consistent with several of Montville's goals, including achieving a more efficient use of existing facilities, and improving Route 32 between Maple Ave. and Raymond Hill Road. It is somewhat consistent with North Stonington's goal of improving Route 2 to safely accommodate the projected volume of traffic.

1.5.6 Alternative F

Alternative F is consistent with several municipal and regional planning goals and objectives. Specifically, it is consistent with Norwich's goal to direct summer beach traffic around the city, and with Waterford's goal of improving Route 32. This alternative is consistent with several of Montville's goals, including achieving a more efficient use of existing facilities, and improving Route 32 between Maple Ave. and Raymond Hill Road. It is somewhat consistent with North Stonington's goal of improving Route 2 to safely accommodate the projected volume of traffic, and would achieve that goal by reducing traffic volumes.

1.6 Public Participation Process and Agency Coordination

The Route 2/2A/32 EIS project includes several methods of public outreach and education. The major components are briefly described below.

- EIS Advisory Committee: made up of one representative and one alternate from the nine study area municipalities, the Mashantucket Pequot Tribe, the Mohegan Tribe, and the cooperating federal, state, and regional agencies. The Advisory Committee met 4 times during the preparation of this Draft EIS.

- Town Board Meetings: with town boards and town officials at key milestones. One set of meetings was held with town boards during the preparation of this Draft EIS.

- Public Information Meetings: at key milestones to present information to the public and answer questions in an informal setting. The first meetings was held December 2 and 3, 1998 in North Stonington and Montville. A second round of meetings is planned to present the results of the transportation and environmental impact analysis. Further public meetings will be held during the design process, following the completion of the Final EIS.

- Project Newsletters: distributed at key points in the EIS project. The first project newsletter was distributed in July 1998 and included a project overview, project history, descriptions of the alternatives, the public participation process, progress to date, and project contacts. The second project newsletter was distributed in February 1999 and updated the public on progress to date, including the environmental resources data collection and mapping, existing traffic conditions, refinement of the planning concepts for the transportation improvements, and upcoming public outreach activities. The third newsletter was distributed concurrent with the publication of this Draft EIS. Two additional project newsletters are planned over the course of the EIS. Project newsletters were distributed by mail and at public meetings. The EIS public mailing list contained over 800 members.

- Toll-Free Telephone Hotline: established during the MIS and maintained throughout the EIS project. All telephone calls are logged, comments recorded, and questions referred to the appropriate technical staff person.

- Agency Coordination: ConnDOT and FHWA have coordinated with the following state and federal agencies during the preparation of this Draft EIS:

    - U.S. Army Corps of Engineers
    - U.S. Environmental Protection Agency
    - U.S. Fish and Wildlife Service
    - U.S. Coast Guard
    - Federal Transportation Authority
    - Connecticut Department of Environmental Protection
    - Connecticut Historic Preservation Commission

- Rhode Island Department of Transportation
- Rhode Island Department of Environmental Management
- Rhode Island State Historic Preservation Office
- Pawcatuck Watershed Partnership Technical Committee

Two agency coordination meetings have been held, and state and federal agencies have participated in a field inspection of the study area.

1.7 Permit Requirements

Regardless of which alternative is selected, implementation will require several permits, certifications and technical reviews at various federal and state levels of jurisdiction. Because this is a state-sponsored project, all local jurisdictions are superseded by the relevant state and federal authorities. As a permit applicant, ConnDOT must obtain the permits and approvals listed below.

- **Federal Water Pollution Control Act** (Clean Water Act), Section 401 (Water Quality Certification) and Section 404 (Department of the Army Wetlands Permit) – required for any of the Build Alternatives due to the placement of fill in wetlands (issued by the Connecticut DEP and Corps of Engineers)

- **Section 10 of the Rivers and Harbors Act** – required for the construction of a new bridge over the Thames River (issued by the Corps of Engineers)

- **Coast Guard Bridge Permit** – required for the construction of a new bridge over the Thames River (issued by the U.S. Coast Guard)

- **Clean Air Act Conformity Determination** – required for any of the Build alternatives (issued by FHWA)

- **Historic Preservation Act** – a Section 106 Memorandum of Agreement (MOA) would be required for any of the Build alternatives due to anticipated impacts on historic resources (concurred by the State Historic Preservation Officer and Federal Advisory Council on Historic Preservation)

- **Section 4(f) Evaluation** – required for any of the Build alternatives due to impacts to public parks, recreation areas, or wildlife refuges, and for impacts to historic resources (issued by FHWA)

- **Section 6(f) Evaluation** – required for any of the Build alternatives due to impacts to properties acquired with Land and Water Conservation Fund assistance (issued by the Department of the Interior)

- **Connecticut Environmental Policy Act (CEPA**) – the Office of Policy and Planning (OPM) will evaluate this project in compliance with CEPA regulations, based on information presented in the Draft and Final EISs

- **Inland Wetlands and Watercourses Act Permit** – required for any of the Build alternatives due to the placement of fill in inland wetlands and alteration of surface water resources (issued by DEP)

- **Tidal Wetlands Act Permit** - required for construction of a new bridge across the Thames River, and potentially for aspects of Alternatives B and C due to construction in proximity to the Thames River (issued by DEP)

- **Coastal Consistency Review (CAM**) – required for those Build alternatives that include work in the Coastal Area (concurrence by DEP)

- **National Pollution Discharge Elimination System (NPDES) Permit** – required for any of the Build alternatives, since each alternative would alter more than 5 acres of land (issued by DEP)

- **Stormwater and Floodplain Certification** – required for any of the Build alternatives, as all of these would require construction within the FEMA 100-year floodplain (issued by DEP)

- **Indirect Sources of Air Pollution** (Indirect Source Permit) – required for Alternatives E and F, which would result in the construction of a new highway on new location and the addition of lanes to existing highways (issued by DEP)

- **Rhode Island Wetlands Permit –** required for Alternatives B, C and D, which would result in work within the jurisdiction of the Rhode Island Wetlands Protection Act (issued by RIDEM)

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